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SEA LAMPREYS OF THE ATLANTIC COAST AND GREAT LAKES

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The sea lamprey (Petromyzon marinus), known also as great sea lamprey, river lamprey, green lamprey, lake lamprey (landlocked form), shad lamprey, lamper-eel, lamphrey-eel, sucker, and nine-eyes, is found in waters of temperate and subarctic latitudes nearly all over the world except in southern Africa. The adult lamprey, once found only in marine waters, has become well established in the Great Lakes and in the lakes of western and northern New York.

This vertebrate, shaped like an eel but unrelated to it, has a smooth, scaleless body. Its maximum length is three feet, and its greatest weight is two pounds or more. The upper part of the adult, spawning lamprey is mottled bluish, brownish, or blackish upon a gray or yellow background; the lower part whitish or grayish. If a lamprey is less than a foot in length, it is not mottled. Its two dorsal fins are separate. Close behind the eye of the adult on each side is a row of seven nearly circular gill openings through which the lamprey breathes. These open internally into a canal below the esophagus and communicating with it near the mouth. The single nostril, on top of the head, is a blind sac. Instead of a mouth with jaws, the lamprey has a round sucking disc, from the center of which rows of sharp, horny teeth radiate in all directions. (Figure 1) One to three larger teeth are on the palate. The tongue is file-like.

Lampreys attain their full growth in the Atlantic Ocean and the lakes, where they gorge for an unknown number of years on the blood and body fluids of fishes. Becoming sexually mature there, they migrate in large numbers in spring or early summer into streams and rivers to spawn. When a spawning movement is under way, these parasites, not feeding actively, make their heaviest migrations during darkness; before the peak of a run males predominate; after the peak, females.1/ While en

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1/ Vernon C. Applegate, The Menace of the Sea Lamprey, Michigan Conservation, May 1947, Vol. XVI, No. 4, pp. 6, 7, 10.

Figure 1
Adult sea lamprey from the Great Lakes,
showing eye, mouth parts, and gill openings.

route to spawning sites, they do not prey on other fishes.

These predators leisurely ascend rivers. To rest, they cling with their large, powerful sucking mouths to rock walls and rocks below or behind waterfalls. Then they make a short jump and rest again and continue this process until they negotiate the obstacle. Sometimes they "hitch" a ride by fastening to hulls or rudders of ships. At other times they attach their mouths to rocks in the stream bed and stretch their bodies in the current until they are refreshed before continuing the journey to the spawning grounds.

Their destination reached, the males and females make nests in the beds of unpolluted streams at depths as great as three feet. With quick bodily movements they uproot the larger stones from areas one to about three feet in diameter. They use their mouths to move stones to the downstream edge of the nest until they have made a three to six-inch depression. After spawning in the pebble and gravel nests at short

intervals over a period of two to four days, the lampreys die and decompose rapidly.

The number of eggs that a female lays is in proportion to her size at maturity. One produced 236,000.[2] Experiments have proved that if a female lamprey is kept away from suitable spawning sites, she dies without releasing her eggs.[3]

Sinking to the bottom of the nests, the heavy, small eggs in from one to two weeks hatch into a toothless, eyeless larval form, called ammocoetes. In the month or so that the larvae remain in the nest they reach a length of about a half inch. The young, still eyeless and toothless, move downstream and burrow in the mud or sand along the margin of the stream. The current brings them minute organic matter, their only food. At this non-parasitic stage they are termed "mud-eels," "mud lampreys," or "sand lampreys." (Figure 2)

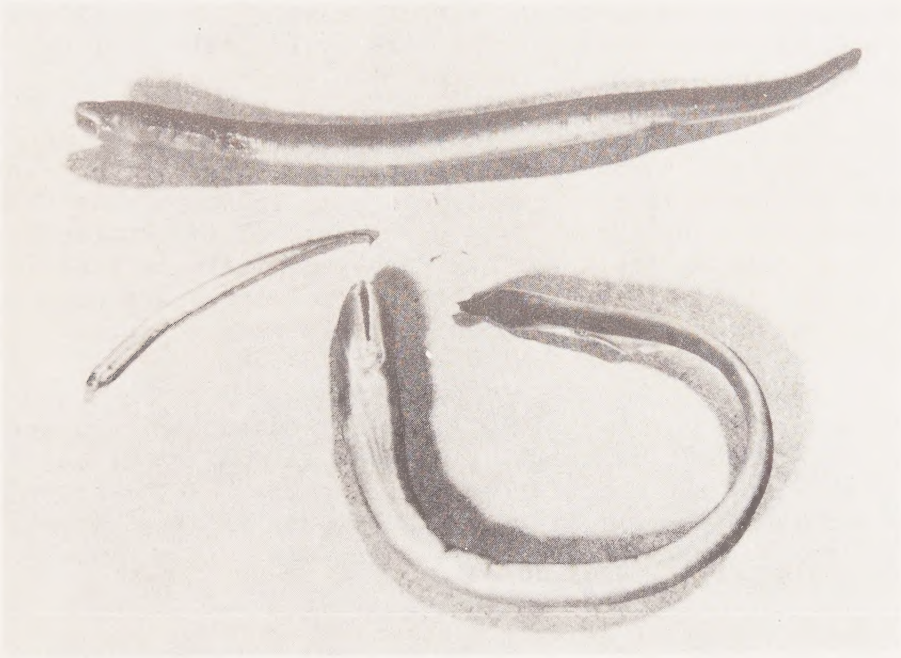

Figure 2
Larval forms of the sea lamprey of the Great Lakes: Upper photograph shows side view of untransformed larva about 4-1/2 inches long; center photograph, an early eyeless stage, about 1-3/4 inches long; lower, same as upper photograph, but ventral view showing untransformed mouth parts.

2/ Simon Henry Gage, The Lampreys of New York State—Life History and Economics. Biol. Surv. of the Oswego River System, Suppl. to 17th Ann. Rept., New York Cons. Dept., 1927, pp. 158-191.

3/ Status of Sea Lamprey Problem, Michigan Conservation, May 1948, Vol. XVII, No. 5, pp. 12, 15.

As its larval period terminates, the lamprey, now six to eight inches long, changes into the adult form. The eyes become more highly developed; the mouth becomes circular, and in it appear the file-like tongue and the sharp, horny teeth. In its mouth develop buccal glands which secrete a substance that prevents the blood of its victims from coagulating.[4] The transformed lamprey now leaves the stream bank and migrates downstream to the lakes or the ocean. There it begins feeding upon the blood and body fluids of fish, its sole nourishment.

A vigorous swimmer, this predator attaches itself to almost any part of a fish. A position under the pectoral fin seems to be preferred. The victim, unable to free itself, continues to swim about. The strong, horny teeth of the lamprey, assisted by the rasping tongue, soon penetrate the fish scales and flesh. Feeding stops when the host is dead or the lamprey becomes glutted. A small fish frequently is killed; a large one, if it escapes, is scarred so badly that it is unmarketable.

The length of the adult predaceous stage before the lamprey becomes sexually mature is unknown. Several biologists estimate it to be from one and a half to three and a half years.[5] Adult life in the lakes is thought to be two years. The life cycle lasts at least five years and may extend to eight.[6]

These pests have a very limited value, although in many European countries they are highly esteemed as human food. Unsuccessful attempts have been made in this country to make lampreys palatable to Americans. Because of softness of body and extreme susceptibility to fungus infection cooking tests failed. Analyses indicate that Vitamin A potency and oil yield of the Great Lakes sea lamprey are much too low for commercial exploitation. Biological supply houses require a small number.

Lampreys have an unlimited liability potential. In the ocean, they attack cod, haddock, mackerel, menhaden, salmon, shad, and sturgeon; often scar swordfish; and even fasten onto sharks. In the Great Lakes, they have contributed to depletion of lake trout, and are attacking carp, herring, smallmouth bass, suckers, whitefish, and yellow pike-perch, and almost all other species there.

These predators have no known natural enemies. Their existence in the St. Lawrence River and in Lake Ontario from early times shows they are adapted to a fresh-water life. Because of the barrier of Niagara Falls they did not have access to the other Great Lakes until construction of the Welland Canal provided a detour, thus enabling the sea lampreys to make a successful invasion.

4/ Vernon C. Applegate, The Menace of the Sea Lamprey, supra.

5/ Simon Henry Gage, The Lampreys of New York State—Life History and Economics, supra.

6/ Vernon C. Applegate, The Menace of the Sea Lamprey, supra.

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